REMARKS

Summary of Office Action

Claims 27-56 are pending.

Claim 37 is allowed.

Claims 27,28,32,35,36 and 56 are rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over U.S. Patent No. 5,824,133 to Tranquilla ("Tranquilla") in view of "Short-Pulse Microwave Treatment of Disseminated Sulfide Ores" to Salsman et al. ("Salsman").

Applicant's Reply

Applicant has cancelled claims 32 and 56 without prejudice. Applicant reserves the right to pursue these claims, prior versions of the claims, and/or the cancelled claims in another application.

Rejections Under 35 U.S.C. §103(a)

In the Office Action, claims 27, 28, 35 and 36 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Tranquilla in view of Salsman.

To reject claims in an application under Section 103, an examiner must establish a *prima facie* case of obviousness. Using the Supreme Court's guidelines enunciated in *Graham v. John Deere*, 383 U.S. 1, 17 (1966), one determines "obviousness" as follows:

> Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined.

In *KSR Int'l Co. v. Teleflex Inc.*, the Supreme Court reaffirmed the *Graham* test, and indicated that although it should not be rigidity applied, a useful test for determining obviousness is to consider whether there is a teaching, suggestion or motivation in the prior art that would lead one of ordinary skill in the art to combine known elements of the prior art to arrive at the claimed invention. *KSR*, 550 U.S. ___, 82 USPQ2d 1385, 1396 (2007)). Importantly, the Court emphasized that a patent Examiner's analysis under Section 103 must be made explicit and there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *Id.*

Independent claim 27 is directed to a method of facilitating the extraction of a mineral extracted from an ore having a plurality of phases of materials. The method recited in claim 27 includes, among other things, exposing the ore to "microwaves having a high enough field strength and being applied for a short enough time to cause differential thermal expansion between materials of different phases to cause weakening between phases whilst **avoiding causing significant chemical changes to the ore, or at least to the mineral to be extracted**." Tranquilla, considered alone or in combination with Salsman, does not disclose or suggest the method as recited in claim 27.

As previously stated by Applicant, Tranquilla is directed to recovery of metal from metal bearing ores by using microwaves to bring about a **metallurgical effect or chemical change**. (*see* col. 1, lines 38-47, Tranquilla). Tranquilla thus teaches causing a chemical change in order to recover metal from metal bearing ores, e.g. the transformation of pyrites to pyrrhotite and hematite. (S*ee* col. 1, lines 26-27, Tranquilla). This is contrary to Claim 27, which recites

the microwaves having a high enough field strength and being applied for a short enough time to cause differential thermal expansion between materials of different phases to cause weakening between phases whilst **avoiding causing significant chemical changes to the ore, or at least to the mineral to be extracted**. Therefore, Tranquilla actually teaches away from claim 27 because it specifically causes chemical or change, which claim 27 categorically seeks to avoid. (*see* col. 1, lines 38-47, Tranquilla). Therefore, Tranquilla does not disclose or even suggest that the feature of exposing the ore to "microwaves having a high enough field strength and being applied for a short enough time to cause differential thermal expansion between materials of different phases to cause weakening between phases whilst **avoiding causing significant chemical changes to the ore, or at least to the mineral to be extracted**." as recited in claim 27.

Respectfully, Examiner's argument that the claimed invention causes chemical changes neglects to acknowledge the avoidance of significant chemical changes in claim 27. The term "significant chemical change" should be given a sensible meaning within the application as a whole. The invention of claim 27 avoids significant chemical changes by exposing the ore to high field strength microwaves for a short enough time to avoid causing such gross chemical changes.

The chemical effects discussed in Tranquilla are more than minor, localized chemical changes. Particularly the transformation of pyrites to pyrrhotite and hematite disclosed in Tranquilla causes breaking of bonds and changing of pyrites to other ion compounds and mixtures. (*see* col. 1, lines 26-27, Tranquilla). The point of the process in Tranquilla is to apply chemical changes to the ore as a whole, which is obviously "significant" within the meaning of

the language of claim 27. Therefore, Tranquilla teaches away from the invention of claim 27 by teaching significant chemical change.

Salsman teaches on page 48 heating material comprising pyrite and calcite with microwaves for 1s, 40ms and 40μs at 10^{10} W/m^3, 10^{12} W/m^3 and 10^{14} W/m^3 respectively. It is clear from the graph that heating the material at 10^{10} W/m^3 for 1s results in a rate of temperature increase that is too slow and any differential thermal expansion between the pyrite/calcite boundary is too small to cause weakening at the boundary. Salsman then goes onto show that at higher microwave power densities significant thermal expansion does occur, in particular, exposing the material to microwaves with a density of 10^{14} W/m^3 for 40μs providing the largest thermal gradient. Therefore, a person of ordinary skill in the art reading Salsman would be led to use a microwave power density of 10^{14} W/m^3 for 40μs for a pyrite/calcite material. By using such as method, the pyrite would reach temperatures above the melting point of 1440K (as can be seen from the graph) and therefore, using such a method would cause significant chemical changes (i.e. melting) of the pyrite.

Therefore, even assuming, *arguendo*, that a person of ordinary skill in the art were to combine the teachings of Tranquilla and Salsman, it does not disclose or suggest all of the features of claim 27, as it this would lead to a method that causes significant chemical changes. Therefore, claim 27 is patentable over the cited art for at least these reasons.

Since claim 27 is allowable, claims 28, 35 and 36 depending therefrom are also allowable.

Claims 33, 34 and 38-49

Included in Applicant's response of May 16, 2007, were amendments to claims 33, 39, 42-44 and 46-49. Applicant believes that these amendments caused claims 33, 34 and 38-

49 to be directed to the same patentably distinct invention as the claims in Group I previously elected, and Applicant requested consideration of these claims.

Independent claim 33 is directed to a method of microwave treatment of a multi-phase material for facilitating the extraction of one phase of the material from another phase of the material. The method recited in claim 33 includes, among other things, "heating said material with microwaves" where the material "experiences exposure to said microwaves in said treatment area" for a "time of the order of 1/2 second or less, said time being a short enough time to avoid causing substantial chemical changes to phase of said multi-phase material that is to be extracted." Claim 33 is allowable over the cited prior art.

Since claim 33 is allowable, claims 34 and 38-49 depending therefrom are also allowable.

CONCLUSION

Applicant respectfully submits that this application is now in condition for allowance. Reconsideration and prompt allowance of which are respectfully requested. It is not believed that there is any further fee due. However, if any fee is due, or if any overpayment has been made, the Commissioner is authorized to charge any such fee or credit any overpayment, to our Deposit Account No. 02-4377. If there are any remaining issues to be resolved, Applicant respectfully requests that the Examiner kindly contact the undersigned attorney for early resolution.

Respectfully submitted,

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